VERMICULIPHILY: LARVAE POLLINATING ORCHIDS!

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ABSTRACT

Orchids are truly extraordinary organisms exhibiting a wide range of pollination mechanism, many of which awaits discovery. *Epipactis veratrifolia* is a terrestrial orchid that has been reported to be pollinated by various species of hoverflies in Israel[1,2]. This orchid is known to emit the smell of aphid pheromone that attracts hoverflies, which lay eggs inside the flower and in the process pollinate them. Recently, we observed a species of hoverfly (*Ischiodon scutellaris*) pollinate the same orchid species in the Western Himalaya while laying eggs inside the flowers. *Ischiodon scutellaris* is being reported for the first time as pollinator of this orchid. However, all flowers don't get pollinated, even though insects visit them and lay eggs inside. In this communication we reveal the fate of those orchid flowers which are visited by the flies but are left unpollinated.

Orchidaceae is the largest family of Angiosperms exhibiting a wide range of distribution as well as pollination mechanisms[3] with the most common mechanism being entomophily. *Epipactis veratrifolia*, one of the insect pollinated ground orchids, is widely distributed from Europe to Asia[4]. Ivri and Dafni reported that, this species lacks spontaneous autogamy though the flowers are completely self-compatible[1]. These authors[1,2] have reported five species of hoverflies as the potential pollinators of this orchid, namely, *Sphaerophoria ruepellii*, *Sphaerophoria scripta*, *Ischiodon aegyptus*, *Eupeodes corollae* and *Eupeodes balteatus*, besides other insects such as *Paragus tibialis*, *Paragus bicolor* and *Paragus aegyptius*. These flowers show ovi-site mimicry to attract hoverflies[2]. It's a kind of deception in which flowers emit smell similar to the alarm pheromone released by several aphid species to which female hoverflies get attracted and lay eggs inside the flower. The larvae of these hoverflies are known to feed on aphids. But till now, there has been no study on the activity of the larvae that are hatched out of the eggs. In the absence of aphids the larvae are supposed to starve to death.

We studied pollination mechanism in *Epipactis veratrifolia* in Indian Western Himalaya during 2009 – 2011 and found that one species of hoverfly, *Ischiodon scutellaris* was the most frequent visitor to these flowers. This is a new record of a pollinator for this particular orchid. Inveigled by the aphid pheromones, these flies lay eggs inside the orchid flowers. However, during the study we found that in as many as 20 of the 100 flowers studied, the insects were unable to dislodge the pollinia from their original position and many flowers could not be pollinated. In such cases, the hoverflies had laid eggs on the outer parts of the flower i.e., the petals and sepals, It was observed that larvae, after hatching out of the eggs crawl inside the still

immaculate and unpollinated flowers. They move over the column and loosen powdery pollen grains on the pollinia lobes and while doing so, they transferred pollen grains to the stigma. Dead larvae were very often observed on the sticky stigmatic surfaces. Such flowers were later observed to bear proper fruits.

This is an interesting and new mode of pollination that has never been reported before. We coin the term '**Vermiculiphily**' for this phenomena where a flower is pollinated by larvae. More studies will be needed on this phenomenon to fathom the evolutionary significance of orchid – hoverfly interaction. In one instance hoverfly larva was actually seen feeding on the orchid petals, which is quite unusual.

References

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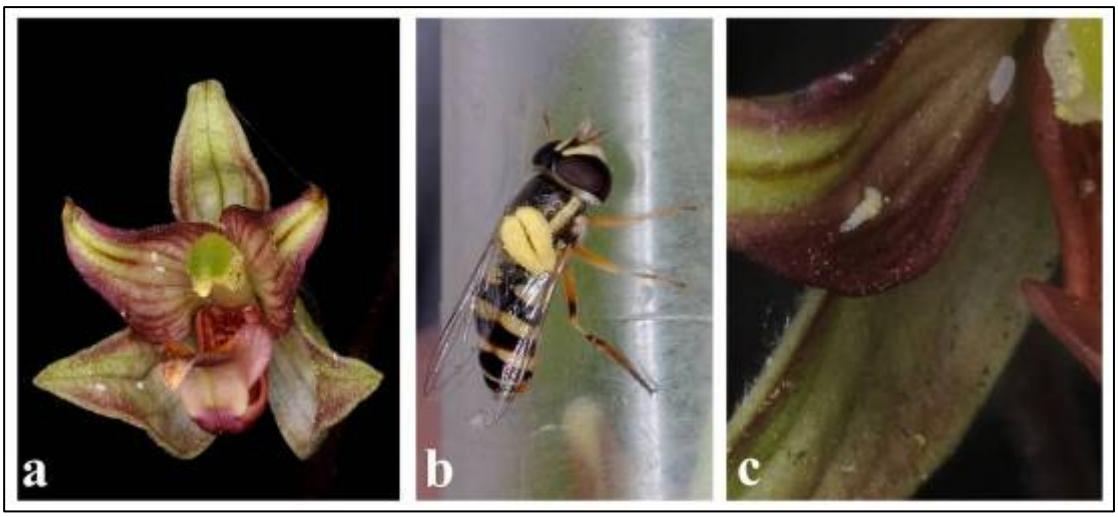

Figure 1: a. Flower of *Epipactis veratrifolia* with white oval hoverfly eggs; b. Hoverfly (*Ischiodon scutellaris*) with pollinia of *Epipactis veratrifolia*; c. Hoverfly larva with yellow pollen grains over its body